Marks: 50

Exam Date & Time: 13-Jan-2024 (02:30 PM - 05:30 PM)





MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. DEGREE EXAMINATIONS -JANUARY 2024 **SUBJECT: ICT 3159- SOFTWARE ENGINEERING**

SOFTWARE ENGINEERING [ICT 3159]

A

Duration: 180 mins.

Answer all t	he questions.	
1A)	Explain the spiral process model with a neat diagram and mention its merits and demerits	(5)
1B)	The UVW School is implementing a system to assess students' time management skills based on their commitment to coursework. The system takes the number of study hours per week (out of 25) and the number of assignments submitted on time (out of 15). The overall time management level is determined as follows:	
	Greater than or equal to 30 - "Excellent Time Management"	
	Greater than or equal to 20 and less than 30 - "Good Time Management"	(3)
	Less than 20 - "Needs Improvement"	
	If the total time management score is less than 0 or greater than 40, an error message ("Invalid Time Management Score") is displayed. Design test cases using equivalence class partitioning and boundary value analysis for this time management assessment system.	
1C)	Evaluate the impact of Scrum's constant duration for sprints on project rhythm and efficiency. Discuss how this approach contributes to better planning and delivery in the context of software development projects.	(2)
2A)	<pre>Construct the control flow graph for the following C program and compute the Cyclomatic Complexity int compute_gcd(int x, int y) { while(x!=y) { if(x>y) x=x-y; else y=y-x; } return x; }</pre>	(5)

Imagine that the size of an organic type software product has been estimated to be 2B) (3) 32,000 lines of source code. Compute the Effort estimate using the COCOMO model.

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2C)
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(2)

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Imagine for a software the count total is 50 and $\sum F_i = 46$ for a moderately complex product. Calculate the Function Point.

3A) Design the test cases for the following code snippet using path testing. You are expected to follow the following steps to design an effective test case with a high probability of revealing defects.

i) Draw the CFG (Control Flow Graph)

printf("Start of the program\n");

- ii) Find the Cyclomatic Complexity using three methods.
- iii) Identify the independent paths (Basic Path Set)
- iv) Derive test cases
 int main() {

```
int x = 0;
  while (x < 5) {
     printf("Value of x: %d\n", x);
     if (x \% 2 == 0) {
       printf("Even\n");
     } else {
       printf("Odd\n");
     }
     x++;
     switch (x) {
       case 1:
          printf("One\n");
          break;
       case 2:
          printf("Two\n");
          break;
       default:
          printf("Other\n");
     }
  }
  printf("End of the program\n");
  return 0;
}
```

(5)

3B) Evaluate the effectiveness of reactive and proactive risk strategies in software project management. Provide examples to illustrate scenarios where each strategy would be most suitable and discuss the implications of relying solely on reactive strategies.

(3)

(2)

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Evaluate the myths associated with software management, customer expectations, and developer perceptions. Explain why the "Mongolian horde" concept is not applicable to software development, supporting your answer with relevant insights.

- 4A) Design a top level use case diagram for a online-shopping site. Web Customer actor uses some web site to make purchases online. Top level use cases are View Items, Make Purchase and Client Register. View Items use case could be used by customer as top level use case if customer only wants to find and see some products. This use case could also be used as a part of Make Purchase use case. Client Register use case allows (5) customer to register on the web site, for example to get some coupons or be invited to private sales. Note, that Checkout use case is included use case not available by itself checkout is part of making purchase.
- 4B) Design a state diagram for a microwave oven. The microwave oven state and description are as following

State	Description			
Waiting	The oven is waiting for input. The display shows			
	the current time.			
Half	The oven power is set to 300 watts. The display			
power	shows 'Half power'.			
Full	The oven power is set to 600 watts. The display			
power	shows 'Full power'.			
Set time	The cooking time is set to the user's input value.			
	The display shows the cooking time selected			
	and is updated as the time is set.			
Disabled	Oven operation is disabled for safety. Interior			
	oven light is on. Display shows 'Not ready'.			
Enabled	Oven operation is enabled. Interior oven light is			
	off. Display shows 'Ready to cook'.			
Operation	Oven in operation. Interior oven light is on.			
	Display shows the timer countdown. On			
	completion of cooking, the buzzer is sounded			
	for five seconds. Oven light is on. Display shows			
	'Cooking complete' while buzzer is sounding.			

4C) The Risk Exposure is computed as $RE = P \times C$. If the risk probability (P) is 80% and Cost of Risk Impact (C) is \$20,000. Solve the value for Risk Exposure. (2)

5A)

(3)

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Consider the activities given below:

Activity	Duration	Predecessor
А	1 Hour	None
В	2 Hours	А
С	1 Hour	None
D	3 Hours	B, C
Е	2 Hours	None
F	4 Hours	D, C
G	6 Hours	F
Н	4 Hours	G

i) Draw the network diagram and identify the critical activities using the Critical Path Method.

ii) How much time is required to complete the project?

iii) What will be the project completion time in the following three scenarios:

a) If activity F gets delayed by three hours due to unforeseen circumstances?

b) If activity C gets delayed by three hours due to unforeseen circumstances?

c) If the activity E gets delayed by three hours due to unforeseen circumstances?

- 5B) Create an activity diagram for the following business process with Swimlane. A Book Store (ABS) runs a collection of story books and novel stores. Every customer must have a valid ABS customer card to rent a book. If not, they have to create a customer card from ABS by paying the membership fee. Once they have the card, they can rent a book. After a customer rents a book, the system will record the rent book. If a book is two or more days overdue, the system will send a notification to the manager of the overdue book and the manager calls the customer to remind them to return the book. If a book is returned in damaged condition, the customer has to pay charges. Otherwise, the customer receives a bonus point.
- 5C) Estimate the effort and staffing required for an embedded-type software project with a size of 35,000 lines of code. (2)

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